REMARKS

Claims 2 and 4 were objected to because of noted informalities. Claims 2 and 4 have been amended to address this issue.

Claims 1, 10, 21 and 38 were rejected under 35 U.S.C. 101 as being directed to non-statutory subject matter. The Examiner asserts that the claims are directed to computer software modules which are asserted to be non-statutory subject matter. Applicants have amended the claims to emphasize that the claimed invention concerns circuitry fabricated on a single integrated circuit substrate. The claims are not, as asserted by the Examiner, directed to just computer software modules. The Examiner's Section 101 rejection is without merit. Applicants claim an integrated circuit substrate embodying certain circuitry and functionality. Such a device clearly presents statutory subject matter.

Claims 1 and 9 were rejected under 35 U.S.C. 102(b) as being unpatentable over Tomasz (US 6031878). The Examiner cites to Section 102(b), but it is believed that the Examiner should have cited to Section 103(a) as the Examiner concedes that Tomasz fails to teach certain claim limitations and instead asserts that these limitations are obvious modifications of Tomasz's teachings. Applicants accordingly treat the rejection of claims 1 and 9 as being a single reference Section 103 rejection.

Claim 1 recites "a tuning circuit of the ***direct sampling type*** including mixed analog and digital circuitry configured to receive ***RF satellite digital television signals*** composed of several channels at a circuit input for ***direct sampling at RF and digital transposition*** to output several downconverted signals each associated with a different selected channel" (emphasis added).

First, Applicants submit that Tomasz fails to teach "a tuning circuit of the direct sampling type." The sampling operation in Tomasz is performed by the A/D converter chip MAX1003/1004. This sampling occurs AFTER analog domain downconversion using the mixing circuitry 68/70. Tomasz fails to teach or suggest "direct sampling at RF and digital transposition" as claimed. Rather, Tomasz teaches analog downconversion and sample for analog-to-digital conversion at or near baseband.

In the office action page 53 the Examiner asserts that "there is enough suggestion provided by the prior art of record Tomasz either independently or in combination that it would be reasonable to have either analog or digital tuning/conversions/modulation." Applicants respectfully disagree and request that the Examiner support this position by citation to Tomasz. Where does Tomasz, which only illustrates an analog domain tuning operation from RF to zero-IF or near-zero-IF, suggest "direct sampling at RF and digital transposition" with respect to a received RF signal?

Second, Applicants reiterate that "the tuning circuit and the several channel decoding circuits are fabricated on that single monolithic substrate." The Examiner concedes that such a single substrate implementation is not taught by Tomasz. It is the Examiner's position a) that Tomasz suggests integration of some elements, b) Tomasz teaches a preferred embodiment for "a single integrated circuit" and c) that it would have been obvious to place various separate components together for purposes of integration. Applicants disagree with the Examiner's analysis and conclusion.

Point a) relates to a Tomasz suggestion for integration. While Tomasz suggests integrating components, there is no suggestion for integrating a direct sampling RF tuning circuit and several channel decoding modules (each for a different channel) as claimed. The suggestion provided by Tomasz is for ***selectively and separately*** integrating the various components. The analog tuner is integrated on a first substrate (see, IC 64), the A/D converter is integrated on a second substrate (see, IC MAX1003/1004), and the DSP is integrated on a third substrate (See, IC 78). The provision of separate substrates (separate IC's) in Tomasz in purposeful, and it is improper for the Examiner to read this teaching for ***separation*** as a suggestion for the claimed complete integration of a direct sampling RF tuning circuit and several channel decoding modules on a single substrate.

Point b) relates to a statement in Tomasz for "a single integrated circuit." The Examiner conveniently ignores that this reference to "a single integrated circuit" is made by Tomasz in connection with processing the DBS signal as "directly converted from the received frequency to baseband" (col. 2, lines 57-59). The Tomasz suggestion is solely for the receiver circuitry (RF to baseband conversion) to be integrated on a single substrate. It is improper for the Examiner to

take the "a single integrated circuit" teaching of Tomasz out of context (RF receiver) and expand that teaching beyond what is actually disclosed. The further teachings in Tomasz for the A/D converter being integrated on a second substrate (see, IC MAX1003/1004), and the DSP being integrated on a third substrate (See, IC 78) clearly teach away from the claimed complete integration of a direct sampling RF tuning circuit and several channel decoding modules on a single substrate.

Point c) states that it would have been obvious to place various separate components together for purposes of integration. However, the Examiner provides no prior art support for reaching this conclusion. The Tomasz reference clearly teaches the use of several IC's (three!) to support the circuitry for handling the received signal from RF to digital signal processing. The obviousness conclusion reached by the Examiner is not supported in any way by the cited prior art. It cannot be obvious to use a single substrate for a direct sampling RF tuning circuit and several channel decoding modules as claimed where the Tomasz prior art clearly limits its single substrate teachings to selected components, and further teaches the use of three different IC's in the complete circuit solution.

On page 54 of the office action, the Examiner asserts that "it is obvious as to whether the individual modules/circuit components reside as integrated together or as separate parts." In support of this position, the Examiner cites to In re Larson, 340 F.2d 965 (CCPA 1965). The Court in Larson notes that integration of two parts in a one piece construction can be merely a matter of obvious engineering choice. This decision cannot be relied on by the Examiner without taking into account the technology being claimed. What is easy and obvious in terms of automotive parts may NOT be so easy or obvious in semiconductor integrated circuitry. In this case, if it were obvious, or if it were an easy engineering implementation, to fully integrate on a single IC, why hasn't the Examiner been able to show even a suggestion in a prior art reference for such a single substrate integration? Still further, why does the art cited by the Examiner explicitly teach away from the invention by using multiple integrated circuit chips for the solution? Applicants submit that it is not obvious in the context of the claimed invention to make a single substrate solution.

In view of the foregoing, Applicants respectfully submit that the claimed invention is patentable over Tomasz.

Claims 2, 10, 11, 13-15, 20, 38, 48-50 and 55 were rejected under 35 U.S.C. 103(a) as being unpatentable over Tomasz in view of Robbins (US 6147713).

Claim 2 is patentable over the cited prior art for at least the same reasons claim 1 is patentable. Claim 2 additionally recites "a multibit analog/digital conversion stage having a sampling frequency equal to at least twice the frequency span of the sampled RF signal." The Examiner points to Tomasz's A/D converter. This converter is identified as the integrated circuit 100 (MAX 1002/1003). Tomasz fails to make any teaching with respect to the sampling frequency, and thus the Examiner has failed to show that the sampling frequency claim limitation has been met. The Examiner's attention to the "level of the oscillator signal" and the discussion in Tomasz col. 4, lines 43-52 is not relevant to the sampling frequency claim language. Additionally, Applicants point out that the IC 100 A/D converter in Tomasz is sampling a downconverted baseband signal at the output of tuner 64, NOT an RF signal as claimed by Applicants.

Independent claim 10 recites "an analog-to-digital converter to sample and convert the RF analog signal to a digital signal." The Examiner concedes that this is not taught by Tomasz. Instead, the Examiner relies on Robbins. However, the analog-to-digital converter 14 in Robbins Figure 1 samples a ***low IF*** signal (i.e., a signal which has already been downconverted from RF). This is similar to operation of the A/D converter 100 in Tomasz. The claim recites sampling for A/D conversion and then downconverting with respect to a received RF signal. There is no teaching or suggestion in either reference for sampling and A/D converting an RF signal. Still further, there is no teaching or suggestion for the claimed "digital tuner" that downconverts the digital signal (the sampled RF signal) output from the analog-to-digital converter.

Applicants further point out that the claim requires that the "circuitry of the converter, tuners and channel decoding digital circuits are fabricated on that single monolithic substrate." The Examiner again refers to Tomasz's preferred embodiment of "a single integrated circuit." As discussed above, this reference to "a single integrated circuit," when taken in proper context, refers only to integrating the tuner functionality on a single substrate. The A/D converter and

digital processing circuits are specifically taught by Tomasz to be integrated on separate substrates distinct from the tuner "single integrated circuit." There is no teaching or suggestion for the claimed fabrication of the recited circuitry on a single monolithic substrate.

In view of the foregoing, Applicants respectfully submit that the claimed invention is patentable over Tomasz and Robbins.

Claim 11 recites that "the first and second digital tuners perform frequency transposition and channel selection in a digital domain." The Examiner asserts that this limitation is met by Tomasz. Applicants disagree. There is no conversion to the digital domain in the Tomasz tuner IC 64 prior to downconversion. Rather, it is clear that mixers 68 and 70 in Tomasz are analog mixers performing analog domain frequency transposition (see, Figures 1 and 2).

Claims 13, 15 and 20 are patentable over the art for at least the reasons recited above with respect to claim 11.

Dependent claim 14 recites: "wherein the channels of the RF analog signal extend over a frequency span and wherein the analog-to-digital converter oversamples the received RF analog signal at a sampling frequency at least twice the frequency span." This claim is patentable over the cited prior art for at least the same reasons as recited above with respect to claim 2. The Examiner fails to address how Tomasz's A/D converter uses a sampling frequency meeting the claim limitation. Additionally, Tomasz's A/D converter does not sample an RF signal.

Claim 38 recites: "a multi-channel direct sampling type tuner circuit that receives an RF analog signal composed of several channels and outputs first and second channel digital signals." As discussed above, Tomasz fails to teach or suggest a direct sampling type tuner circuit receiving RF signals. The tuner in Tomasz uses analog frequency transposition to zero-IF or near-zero-IF before sampling occurs. There is no teaching for direct sampling of the received RF signal in connection with tuning.

Claim 38 further recites: "wherein the tuner circuit and the first and second channel decoder circuits are fabricated on that single monolithic substrate." As discussed above, the cited prior art fails to teach or suggest fabrication of circuitry for a direct sampling tune and digital decoder circuits on a single substrate. The Examiner again refers to Tomasz's preferred embodiment of "a single integrated circuit." As discussed above, this reference to "a single

integrated circuit," when taken in proper context, refers only to integrating the tuner functionality on a single substrate. The A/D converter and digital processing circuits are specifically taught by Tomasz to be integrated on separate substrates distinct from the tuner "single integrated circuit." There is no teaching or suggestion for the claimed fabrication of the recited circuitry on a single monolithic substrate.

In view of the foregoing, Applicants respectfully submit that the claimed invention is patentable over Tomasz and Robbins.

Claims 48, 50 and 55 are patentable over the art for at least the reasons recited above with respect to claim 38.

Claim 49 recites: "wherein the channels of the RF analog signal extend over a frequency span and wherein the analog-to-digital converter oversamples the received RF analog signal at a sampling frequency at least twice the frequency span." This claim is patentable over the cited prior art for at least the same reasons as recited above with respect to claims 2 and 14. The Examiner fails to address how Tomasz's A/D converter uses a sampling frequency meeting the claim limitation. Additionally, Tomasz's A/D converter does not sample an RF signal.

Claims 7 and 8 were rejected under 35 U.S.C. 103(a) as being unpatentable over Tomasz in view of Lieber (US 5220164). Claims 7 and 8 are patentable over the cited prior art for at least the reasons recited above with respect to claim 1.

Claim 3 was rejected under 35 U.S.C. 103(a) as being unpatentable over Tomasz in view of Hwang (US 4894657). Claim 3 is patentable over the cited prior art for at least the reasons recited above with respect to claim 1.

Claims 4-6, 16-18 and 51-53 were rejected under 35 U.S.C. 103(a) as being unpatentable over Tomasz in view of Robbins and Hwang. Claims 4-6, 16-18 and 51-53 are patentable over the cited prior art for at least the reasons recited above with respect to their respective base independent claims.

Claim 4 is further believed to distinguish over the cited prior art for at least the reasons recited above in connection with claim 2.

Claims 21-28, 30-32, 37, and 39-46 were rejected under 35 U.S.C. 103(a) as being unpatentable over Tomasz in view of Robbins and Young (EP 0481543).

Claim 21 recites: "a first analog-to-digital converter to sample and convert the RF analog signal to a first digital signal; [and] a second analog-to-digital converter to sample and convert the RF analog signal to a second digital signal." The Examiner concedes that these converters are not taught by Tomasz. Instead, the Examiner relies on Robbins. However, the analog-to-digital converter 14 in Robbins Figure 1 samples a ***low IF*** signal (i.e., a signal which has already been downconverted from RF). This is similar to operation of the A/D converter 100 in Tomasz. The claim recites sampling for A/D conversion and then downconverting with respect to a received RF signal. There is no teaching or suggestion in either reference for sampling and A/D converting an RF signal. Still further, there is no teaching or suggestion for the claimed first and second digital tuners that downconverts the digital signal (the sampled RF signal) output from the analog-to-digital converter.

Applicants further point out that the claim requires that the "the converters, tuners, channel decoding digital circuits and switching circuit are fabricated on that single monolithic substrate." The Examiner again refers to Tomasz's preferred embodiment of "a single integrated circuit." As discussed above, this reference to "a single integrated circuit," when taken in proper context, refers only to integrating the tuner functionality on a single substrate. The A/D converter and digital processing circuits are specifically taught by Tomasz to be integrated on separate substrates distinct from the tuner "single integrated circuit." There is no teaching or suggestion for the claimed fabrication of the recited circuitry on a single monolithic substrate.

In view of the foregoing, Applicants respectfully submit that the claimed invention is patentable over Tomasz and Robbins.

Claims 22-27, 30, 32, and 37 are patentable over the art for at least the reasons recited above with respect to claim 21.

Claim 28 recites that "the first and second digital tuners perform frequency transposition and channel selection in a digital domain." The Examiner asserts that this limitation is met by Tomasz. Applicants disagree. There is no conversion to the digital domain in the Tomasz tuner IC 64 prior to downconversion. Rather, it is clear that mixers 68 and 70 in Tomasz are analog mixers performing analog domain frequency transposition (see, Figures 1 and 2).

Claim 31 recites: "wherein the channels of the RF analog signal applied to each analog-to-digital converter extend over a given frequency span and wherein each analog-to-digital converter oversamples the received RF analog signal at a sampling frequency at least twice the given frequency span." This claim is patentable over the cited prior art for at least the same reasons as recited above with respect to claims 2, 14 and 49. The Examiner fails to address how Tomasz's A/D converter uses a sampling frequency meeting the claim limitation. Additionally, Tomasz's A/D converter does not sample an RF signal prior to downconversion as claimed.

Claims 39-46 are patentable over the art for at least the reasons recited above with respect to claim 38.

Claims 12 and 47 were rejected under 35 U.S.C. 103(a) as being unpatentable over Tomasz in view of Robbins and Dapper (US 6275990). Claims 12 and 47 are patentable over the cited prior art for at least the reasons recited above with respect to their respective base independent claims. Claims 12 and 47 further recite that "the analog-to-digital converter oversamples the received RF analog signal." Col. 94 of Dappers discusses a signal which has been downconverted to an intermediate frequency of 18.432 MHz. This signal is then oversampled. Dapper accordingly fails to teach oversampling an RF signal as claimed.

Claims 19 and 54 were rejected under 35 U.S.C. 103(a) as being unpatentable over Tomasz in view of Robbins and Lieber. Claims 19 and 54 are patentable over the cited prior art for at least the reasons recited above with respect to their respective base independent claims.

Claim 29 was rejected under 35 U.S.C. 103(a) as being unpatentable over Tomasz in view of Robbins, Young and Dapper. Claim 29 is patentable over the cited prior art for at least the reasons recited above with respect to its independent base claim. Applicant further submits that this claim is patentable for the reasons recited above with respect to claims 12 and 47.

Claims 33-35 were rejected under 35 U.S.C. 103(a) as being unpatentable over Tomasz in view of Robbins, Young and Hwang. Claims 33-35 are patentable over the cited prior art for at least the reasons recited above with respect to their base independent claim.

Claim 36 was rejected under 35 U.S.C. 103(a) as being unpatentable over Tomasz in view of Robbins, Young and Lieber. Claim 36 is patentable over the cited prior art for at least the reasons recited above with respect to its independent base claim.

In view of the foregoing, Applicants respectfully submit that the application is in condition for favorable action and allowance.

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Respectfully submitted,

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